Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20054

In the Matter of	)	
	)	
Carriage of the Transmissions	)	
of Digital Television Broadcast	)	**CS Docket No. 98-120**
Stations	)	
	)	
Amendments to Part 76	)	
of the Commission's Rules	)	

REQUEST TO ACCEPT LATE-FILED REPLY COMMENTS

Zenith Electronics Corporation hereby requests the Federal Communications Commission to accept the attached late-filed Reply Comments in the above-captioned proceeding.

Reply Comments were due on December 22, however, last-minute computer problems made it impossible to deliver this material to the Secretary's office before that office had closed.

Copies of these Reply Comments were mailed on time to other parties in this proceeding, as noted on the attached service list, and these Reply Comments are being filed with the Commission on the following morning. Consequently, we believe that no party to this proceeding will be prejudiced by Commission acceptance of this late submission. Accordingly,

in the interest of obtaining a full public record on this important matter, we respectfully request the Commission to accept the attached Reply Comments of Zenith Electronics.

Respectfully submitted,

Zenith Electronics Corporation

By: Wayne C. Luplow RKS

Wayne C. Luplow
1000 Milwaukee Avenue
Glenview, IL 60025

December 23, 1998

Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20054

In the Matter of	)	
	)	
Carriage of the Transmissions	)	
of Digital Television Broadcast	)	**CS Docket No. 98-120**
Stations	)	
	)	
Amendments to Part 76	)	
of the Commission's Rules	)	

REPLY COMMENTS OF

ZENITH ELECTRONICS CORPORATION

December 22, 1998

TABLE OF CONTENTS

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20054

In the Matter of	)	
	)	
Carriage of the Transmissions	)	
of Digital Television Broadcast	)	**CS Docket No. 98-120**
Stations	)	
	)	
Amendments to Part 76	)	
of the Commission's Rules	)	

REPLY COMMENTS OF

ZENITH ELECTRONICS CORPORATION

I. INTRODUCTION AND STATEMENT OF INTEREST

Zenith Electronics Corporation respectfully submits these Reply Comments on the above-captioned Notice of Proposed Rule Making (Notice) released July 10, 1998. Zenith is a long-time leader in consumer electronics and cable technologies, a primary developer of digital high-definition television (HDTV) and the inventor of the digital television (DTV) transmission subsystem adopted by the Commission as part of the Advanced Television Systems Committee (ATSC) DTV Standard.

In its October 13, 1998, Comments, Zenith underscored the importance of the television consumer when DTV carriage issues are decided. Consumer DTV equipment costs, ease-of-installation, the cost of obtaining programming and elimination of user confusion were all cited as keys to successful DTV service launch and buildout enabling spectrum reassignment. We urged the Commission to mandate no degradation of services or quality of service and an absolute minimization (ideally, none) of equipment peripheral to DTV receivers as a result of carriage of broadcasters' signals via cable.

The most consumer friendly digital interconnect is the ATSC remodulator discussed in Zenith's earlier comments in these Proceedings.[1] This low-cost solution to interconnectivity resulted in the EIA-762 Standard, "DTV Remodulator Specification," for 8 VSB. In November, 1998 the Consumer Electronics Manufacturers Association (CEMA) also completed its work on the 16 VSB version, EIA-761, "DTV Remodulator Specification with Enhanced OSD Capability." In addition to doubling of the data payload (from 19.4 Mbps to 38.7 Mbps) for cable carriage, the additional data capability allows for the transmission of very sophisticated On Screen Display (OSD) data from a digital source device such as a cable set-top-box to an ATSC-compliant TV receiver. The *ATSC Remodulator* is a *universal DTV interconnect,* as it enables direct connection of digital VCRs, digital satellite receivers, DVDs, computers and the like to ATSC DTV receivers.

In 1995 the Commission's own Advisory Committee on Advanced Television Service provided the 16 VSB high data rate mode for cable applications. The Commission should require the use of ATSC 8 VSB and 16 VSB for carriage of broadcaster provided free, over-the-air service. If some cable operators choose to use other than ATSC VSB for delivery of their scrambled premium services, the output of such set-top descramblers is most cost-effectively connected to DTV receivers via an *ATSC Remodulator*. Therefore, we again urge the Commission to mandate the carriage of broadcasters' signals and to require the use of the ATSC modulation standard by cable for broadcast carriage.

To do anything less will certainly delay deployment of DTV, delay spectrum reclamation and place major, but unnecessary, burdens on U.S. consumers, such as the need to use set-top-boxes and the commensurate loss of feature functionality.

[1] Comments of Zenith Electronics Corporation. CS Docket No. 98-120 (filed October 13,1998), at I, p. 3.

II. THERE *IS* ADEQUATE BANDWIDTH IN EXISTING CABLE SYSTEMS

It appears from the comments filed that many (both cable entities and broadcasters alike), are not aware that all existing cable plants have additional bandwidth available for digital transmission that is not available for analog usage.

In the so-called "roll-off" region of cable spectrum, the upper limit of the frequency range available to (and used by) cable operators *for analog signals* is limited by the requirement to retain linear operation, as measured by intermodulation distortion (IM) and composite triple beat distortion (CTB) and to simultaneously meet the FCC specified analog carrier-to-noise ratio (C/N), currently 43 dB. The headroom or margin required to reliably maintain this important operational parameter diminishes as channel frequency increases. Digital signals, however, by their very nature, require considerably less headroom than analog signals. Instead of a C/N = 43 dB as needed for analog signals, the ATSC 8 VSB digital signal only requires a 15 dB C/N. Thus, by using the roll-off region beyond the frequencies which are no longer useable for analog signals, several 6 MHz DTV signals can be inserted. To prevent any interference into existing analog services, the digital signal can be transmitted at 6 dB less power than the analog signals. This still gives a margin in excess of 20 dB (43 dB – 6 dB – 15 dB > 20 dB).

The exact number of 6 MHz, 8 VSB DTV channels that could be inserted in this manner is dependent upon the design of any given cable system. While it is Zenith's opinion that most systems would support 4-6 additional 6 MHz digital channels in this manner, we would encourage the Commission to take the necessary steps to obtain such "roll-off" region data from the cable operators.

The capability to use existing cable spectrum for DTV (which is unusable for analog services) will easily support carriage of the relatively small number of channels that terrestrial broadcasts will begin to offer in each market during the next 1-2 years. Beyond that, the timetable planned for the expansion of cable system bandwidth will support the addition of all broadcast

channels, not just the early adopters, in most television markets. When cable systems have been effectively expanded to raise the frequency of the onset of the "roll-off" region, the 38.7 Mbps 16 VSB signals can then be added below the "roll-off" region.

III. THE USE OF A/B SWITCHES IS AN ENTIRELY UNSATISFACTORY ALTERNATIVE TO DTV CARRIAGE REQUIREMENTS

The underlying wisdom of Congress in passing the 1992 Cable Act holds today. That is: "...*no cable operator should be required to provide or make available such a switch.*[2] The Act stated that an A/B switch is not an enduring or feasible method for the reception of television signals. In the intervening six years there has been no technological breakthrough or improvement in consumer functionality that warrants any changes in this finding. Congress's reasons for avoiding A/B switches are still valid today.

Many consumers rely on cable television service.

It is estimated that 68% of U.S. television households (65 million) receive their broadcast signals over cable systems and not from terrestrial signals obtained by means of external or indoor antennas. This carriage is a result of negotiated agreements or under must carry obligations. Moreover, the 68% is an average, and in many areas subscriber penetration is 80% or even higher. A great number of consumers no longer have external antennas because of the convenience and choice offered by cable. Providing an external antenna where none exists would be an expensive hurdle. For single family homeowners it would be a several hundred-dollar expense and would carry an aesthetic stigma in communities with buried power, telephone and cable wires. In multifamily dwellings the household might not own the building, but could be dependent on a community antenna system that is connected to a cable system or an antenna. Recent Commission actions have alleviated some of the local restrictions against external antennas, but because many

[2] 47 U.S.C. §534(e).

consumers have already paid for cable installation and are already paying for delivery of television service, they will not be anxious to change over to terrestrial reception via an external antenna. Thus, any provision requiring an external antenna, outdoor or indoor, represents a disincentive to many consumers and would severely constrain the adoption of DTV.

Obtaining cable-supplied broadcast-originated DTV directly would significantly reduce consumer confusion.

The history of attempting to combine signals from cable and other external sources is one of consumer frustration. It would be even more frustrating and confusing as DTV is launched if an ill-advised A/B switch were to be used as an alternative to requiring cable carriage. Initially, many consumers will have NTSC television receivers and will rely on external set-top devices to convert over-the-air DTV signals to a display format compatible with their existing NTSC television receivers. However, because the DTV signals on cable probably will not be compatible with those from terrestrial broadcasters, for these consumers there would be two set-top devices: one for cable DTV programming and another for broadcast DTV programming. Interconnection and use of a cable source, a cable set-top box, a broadcast source, a DTV set-top box and one or more VCR would be prohibitively daunting. Not only would switching be required between incoming cable and terrestrial signals, it would also be required that the input to the NTSC receiver be switched from the corresponding NTSC output of the cable or terrestrial DTV set-top device. This is not something that most consumers would look forward to or willingly embrace. This is a non-solution for most people, and another hurdle that would significantly delay the rollout of DTV.

Obtaining cable-supplied DTV with DTV receivers is difficult, confusing and expensive.

In the scenario where a consumer has purchased a DTV receiver capable of both DTV and HDTV display, the situation caused by separate sources for cable and terrestrial signals would also be difficult. The U.S. cable industry has announced plans to install four to five million DTV set-

top units using current technology, and has reportedly, already installed about one million of these units. These initial set-top units:

- are not capable of decoding cable-originated HDTV or over-the-air originated DTV/HDTV signals,
- do not have a standardized interface for providing DTV signals to presently available DTV receivers (much less HDTV receivers), and
- as a consequence, can easily provide *only* NTSC display quality to purchasers of initial DTV receivers, in some cases costing in excess of $5,000, *unless the cable operator carries the broadcast or cable originated HDTV signal in ATSC VSB transmission format and provides a signal pass-through to the ATSC VSB compliant DTV receiver.*

A consumer who has purchased a DTV/HDTV receiver, has a current digital cable set-top and is connected to a cable system:

- must realize that *only* NTSC quality can be received if non-ATSC digital modulation is used, and
- must rely on a switched external source to obtain terrestrial HDTV signals, *unless*
  - ✓ *the cable operator uses ATSC modulation for broadcaster-originated programs, and*
  - ✓ *the cable operator uses ATSC modulation for cable-originated programs.*

These are not incentives to rush out and buy DTV receivers to connect to cable.

Cable signal incompatibility is not solved with A/B switching.

The A/B switch and the concomitant multiple signal sources present another problem. Digital TV signals generally are able to carry one HDTV or multiple SDTV programs on a single channel. For the consumer to navigate multiple programs over multiple channels, transmitted channel selection data is required. The cable industry plans to use an incompatible transmission signal, and also plans to send its channel selection data separately in an out-of-band channel.

Terrestrial broadcasters will follow the ATSC's Program and System Information Protocol (A/65) to send the channel selection data within the broadcast signal.

Industry developed standards are preferred to A/B switches.

Applicable standards for both cable and consumer devices are a work-in-progress and are currently underway through the aegis of multiple standards bodies. Zenith and dozens of other industry members are working hard on standards involving signal interface, copy protection and security to develop solutions that will benefit consumers. The A/B alternative is not one of the solutions being addressed, because it is not seen by the industry as a viable alternative.

In summary, the use of A/B switches, as an alternative to carriage on cable is not a practical solution. It is not consumer friendly, and in most cases it is not a solution at all because of the difficulty and expense of providing an external signal source to receive terrestrial signals. Required cable carriage is the only effective alternative that will assure consumers, program providers and deliverers, and the government of a fast rollout of DTV.

IV. COPY PROTECTION REQUIREMENTS SHOULD NOT DELAY DTV STARTUP

Zenith believes, as stated in our comments in this proceeding, copy protection issues should not delay the current DTV rollout schedule. Many companies and organizations, including Zenith, have invested immense resources in order to be prepared for the current rollout schedule. Any delay in the rollout will adversely affect many of these companies and put the entire DTV transition into question. This view is consistent with and reinforced by the following comments of other parties in these proceedings. (1) "The Commission should, however, monitor this process to ensure that limited progress in copy protection negotiations does not emerge as an impediment to the introduction of digital television.[3] (2) "The Commission should not delay the

[3] Comments of Mitsubishi Electric America..., CS Docket No. 98-120 (filed October 13,1998) at VII, p.6

implementation of digital television on the basis of copy protection concerns."[4] Furthermore, the content being planned for release to terrestrial broadcasters in the near future will most likely not be "premium" programming and will not be subject to copy protection systems.

We cannot agree, however, with the following statement by Bell South when it says: "Thus in the pass-through scenario, implementation of copy protection solutions clearly is not within the purview of cable operators, and is more appropriately the responsibility of digital television manufacturers, not the Commission." [5] To the contrary, the responsibility for copy protection *should* be distributed among the content providers, cable operators, and television manufacturers. The content providers and cable operators are the organizations that directly profit from the distribution of premium services. If these companies were given some type of responsibility in the overall system, then the copy protection system will be more consumer-friendly and reliable, as the companies directly involved in the financial aspects of the system would be at least partially responsible for the system.

Zenith supports the statement of Benedek Broadcasting, *et al,* "The Commission should also recognize that other technical standards, including standards relating to encryption, video formats, channel navigation and program guides, need to be established or harmonized to enable digital consumer and cable equipment to interact fully."[6] With respect to such open technical issues, before November 1999, the Commission should set firm deadlines for the finalization of such standards. Specifically, we agree that encouragement by the Commission may be required to ensure that the encryption method intended for copy protection systems with digital interfaces is resolved in a timely fashion. This position is consistent with the Motion Picture Association

---

[4] Comments of the Consumer Electronics Manufacturers Association (CEMA), CS Docket No. 98-120 (filed October 13,1998) at V.2, p.25

[5] Comments of Bell South, and Bell South Interactive Media Services, Inc., CS Docket No. 98-120 (filed October 13,1998) at III.B.5 p.23

[6] Comments of Benedek Broadcasting Corporation, *et al,* CS Docket No. 98-120 (filed October 13,1998) at III A.3, p. 18.

of America's comment[7] that the Commission should promote and support industry standards for copy protection.

V. THE COMMISSION SHOULD ENCOURAGE OPEN INDUSTRY STANDARDS FOR COPY PROTECTION

Responding to the Commission, Zenith has actively participated in the consumer electronics industry's CEMA R-4.8 WG2 effort to develop open standards for copy protection. In conjunction with Thomson Consumer Electronics, Zenith has proposed a digital copy protection solution for IEEE-1394 and other interfaces. This proposal, known as Extended Conditional Access (XCA) is a *renewable* copy protection system that maximizes the flexibility of interconnected digital products, including those using the 1394 interface. XCA combines advanced smart-card technology with the 1394 interface to provide what Zenith and Thomson consider the optimum copy protection solution for the motion picture industry and the consumer.

The 5C proposal has major shortfalls.

Although we recognize that there has been considerable effort by Hitachi, Intel, Matsushita, Sony and Toshiba, as described in their joint comments[8] containing their proposed copy protection solution, the so-called "5C" approach, is based solely on data *transmission* requirements. This proposal does not adequately address the *storage* of data. Additionally, the 5C proposal requires that "secrets" (key management, encryption), which are not easily renewable, be imbedded within the DTV receiver. Given the history of electronic piracy, it is a matter of *when*, not *if*, a system will be breached by pirates. Zenith is concerned that if a security breach is accomplished, the consumer device incorporating 5C will suffer *revocation* and will go dark for those services, irrespective of the consumer's guilt or innocence with respect to piracy. Without a means of renewing those "secrets," the consumer will be denied full use of his or her

[7] Comments of Motion Picture Association of America, CS Docket No. 98-120 (filed October 13, 1998), p. 3
[8] Comments of Hitachi, Ltd., *et al*, CS Docket No. 98-120 (filed October 13,1998) "5C Digital Transmission

legacy consumer product. XCA avoids such a situation by not imbedding "secrets" within the consumer device, but instead uses an easily renewable smart card.

The current 5C proposal does not address all digital interfaces.

The 5C proposal requires two-way communication capability. Market forces and consumer price sensitivity precludes a single solution. As DTV receiver sales grow and price points decline, there will be a market for inexpensive DTV receivers that will be used in kitchens and other areas. In these situations, interactive and transactional functionality provided by two-way interconnectivity may have little, if any, perceived value to consumers. Accordingly, other digital interfaces will be needed to satisfy price sensitive consumers. To date, the licensing group associated with the 5C proposal has shown no public interest in supporting the one-way, remodulator interfaces standardized by CEMA (EIA Standards: EIA761 and EIA 762). This is another reason that Zenith and other consumer electronics manufacturers consider the 5C proposal incomplete.

Copy protection needs resolution.

Zenith supports Microsoft[9] and Philips[10] in their statements that the copy protection issue is unresolved. Although some assertions from 5C member companies are intended to suggest that this issue is resolved, the reasons detailed above and comments from non-5C companies should create considerable concern related to this assertion. Thus, the Commission should encourage open industry standards for copy protection.

Content Protection White Paper," Revision 1.0 July 14, 1998.

[9] Comments of Microsoft Corporation, CS Docket No. 98-120 (filed October 13,1998), p. i

[10] Comments of Philips Electronics North America, CS Docket No. 98-120 (filed October 13,1998), B.2, p. 13

VI. THERE ARE SEVERAL DIGITAL INTERCONNECTION SOLUTIONS

We support Harris' comments[11] that there are multiple options for connecting cable set-top boxes to the new digital television sets (RF remodulator, pass-through, and component video connections). Any of these will permit consumers to access the higher definition formats and the additional features of digital broadcasting systems. Past history in consumer electronics has shown that market segmentation, based on consumer applications and cost sensitivity, will occur.

The role of the IEEE-1394 interface.

As stated in our earlier comments, the IEEE-1394 approach is not the only solution for interconnection among cable boxes, DVCRs, DVDs and DTVs. The 1394 approach certainly has a proper place in the digital world, but it is a step-up solution due to its complexity and cost. RF remodulation, using the ATSC transmission standard, and/or component video and audio are considered as the baseline interconnection standards. As seen in the comments filed by Circuit City,[12] General Instrument,[13] Philips Electronics North America[14] and Thomson Consumer Electronics,[15] IEEE 1394 must be considered as only a partial solution.

We agree with the observations of Thomson Consumer Electronics [16] and Circuit City [17] that first generation DTVs, in general, do not support the 1394 interface. This will most likely be true for many DTVs made in the future as well, inasmuch as the consumer in many cases will not be willing to pay for the extra cost associated with the1394 interface unless the interactive and transactional functionality are of value.

Zenith fully supports MSTV's statement that the 1394 interface is not a total solution because: (1) as currently proposed, it may not permit the transmission of an HDTV signal to the

---

[11] Comments of Harris Corporation, CS Docket No. 98-120 (filed October 13,1998) IV, P.8.
[12] Comments of Circuit City Stores, Inc., CS Docket No. 98-120 (filed October 13,1998) III, p. 9.
[13] Comments of General Instrument Corporation, CS Docket No. 98-120 (filed October 13,1998), p. 4
[14] Comments of Philips Electronics North America, CS Docket No. 98-120 (filed October 13,1998) B.2, p.12
[15] Comments of Thomson Consumer Electronics Corporation, CS Docket No. 98-120 (filed October 13,1998) IV.B, p.22
[16] op. cit. IV.B, p.24

receiver in its original format; and (2) it would prolong reliance on set-top boxes, rather than cable-ready receivers -- which would free consumers from the need to buy or lease a set-top box.[18] Clearly, it is in the best interest of consumers to have as few as possible (ideally, none) set-top boxes.

The National Association of Broadcasters statement that the FCC should obtain assurances that 1394 will appear universally on both set-top boxes and DTV receivers[19] is in direct conflict with the often proven fact of market place determination. Market forces will determine which interfaces will be used among consumer electronic products. Zenith is strongly opposed to any regulatory requirement to specify exact interfaces which must appear on DTV receivers.

RF input is the universal input.

The role of the RF input is often misunderstood by those not familiar with the television receiver industry. Microsoft's statement,[20] "... there is no input jack on any of the digital television receivers coming out in the fall," is not completely correct. Every digital television receiver has the 8 VSB input to enable reception of the terrestrially broadcast ATSC RF signal. In addition, many DTV receivers have an analog component video input, which can be used for input from cable or other set-top units. Both interfaces support up to two million pixels per video frame to the display of the consumer's choosing.

The cost of adding remodulation capability to set-tops, VCRs and the like will be modest -- comparable to analog NTSC remodulators. Microsoft's[21] comment that remodulation would require "hundreds of dollars" added to the cost of a set-top is completely unfounded and

---

[17] op. cit. p.8.
[18] Comments of The Association for Maximum Service Television, Inc., CS Docket No. 98-120 (filed October 13,1998) III.A.8, pp. 41-42.
[19] Comments of National Association of Broadcasters, CS Docket No. 98-120 (filed October 13,1998) Appendix G, pp.4-5.
[20] op. cit. p. 11.
[21] op. cit. P. 13.

misleading as well. Specifically, Microsoft states "...because broadcasters will be transmitting in various formats, the advanced set-top box capable of handing remodulated signals would have to be able to process formats from 480i up to 1080i."[22] It should be noted that all set-tops designed to handle ATSC-compliant streams will need to support all of the ATSC formats. This is not a requirement unique to remodulators. In any event, the cost to support all formats, rather than just a subset, is insignificant.

DTV RF interface is standardized.

A 75 ohm RF input jack is available on every DTV receiver. Microsoft's statement that, "However, there are no standards available today that overcome copy protection and interconnection issues," is not completely correct. CEMA's R-4 Committee formally approved EIA-762, the remodulation standard for ATSC 8 VSB trellis-coded signals in August 1998. In November 1998, the same committee also approved EIA-761; the 16 VSB remodulation standard with greatly enhanced OSD capability. In addition, as noted above, Zenith and Thomson are in the process of developing a copy protection solution (XCA) for the remodulator and for all digital interfaces. This copy protection solution is undergoing the same type of industry scrutiny and evaluation as the 1394 approach and the remodulator standards, and this solution is moving forward expeditiously.

Zenith strongly supports Thomson Consumer Electronics[23] and Philips Electronics North America[24] statements that the Commission should require that cable operators provide an ATSC 8 VSB output directly for input to ATSC compliant digital television receivers.

---

[22] ibid
[23] op. cit. III.B, p. 17 and III.C, p. 18.
[24] op. cit. III.B.1, p.11

VII. CONCLUSION

The rapid and smooth transition to DTV, and the return of analog spectrum, requires specific actions and monitoring by the Commission:

- Recognize that adequate bandwidth for digital signals already exists in cable facilities to accommodate the DTV programming of all early adopting broadcasters.
- Mandate carriage by the cable industry of all free DTV broadcaster-originated programs.
- Require no degradation in the quality of broadcaster-originated services provided by the cable industry.
- Require the use of the ATSC, 8 VSB modulation standard by the cable industry for carriage of all broadcast programs to assure DTV reception by early adopters who use cable.
- Recognize that A/B switching is not viable and is entirely unsatisfactory for consumer use.
- Encourage industry to rapidly provide marketplace options for interconnection of DTV equipment.
- Recognize that the most consumer-friendly, universal interface to DTV receivers is the RF input.
- Encourage an open industry standards approach to digital copy protection, with date-certain completion.

We recognize the difficulty in the Commission's task of balancing market and regulatory approaches to the new digital world. The incongruities are sometimes very striking. The cable industry is rushing to complete its digital rollout of several million digital set-tops. Yet, if a cable subscriber purchases an HDTV digital television receiver, he or she currently can receive a full HDTV program on cable only if the cable operator carries a broadcast originated program in an ATSC-compliant transmission format. Home Box Office (HBO) has announced that it will start delivering HDTV programming via satellite early next year. The HBO programming will be viewable in HDTV to a cable subscriber only if the operator sends the signal in an ATSC-

compliant transmission format. The current digital set-tops that cable is deploying cannot decode full HDTV.

Respectfully submitted,

ZENITH ELECTRONICS CORPORATION

Thomas Sorenson
Vice President, Digital Business Development

John I. Taylor
Corporate Vice President, Public Affairs
Zenith Electronics Corporation
1000 Milwaukee Avenue
Glenview, Illinois 60025
(847) 391-8181
jtaylor@zenith.com

CERTIFICATE OF SERVICE

I, Wayne Luplow, hereby certify that copies of the foregoing Reply Comments of Zenith Electronics Corporation were served by hand or by First-Class United States mail, postage prepaid, upon the parties appearing on the attached service list this 22nd day of December, 1998.

Wayne Luplow

Mitsubishi Electric America, Inc.
Mr. John A. Savage
Executive Vice President
1150 Connecticut Avenue, NW, Suite 1010
Washington, D.C. 20036

Hitachi, Ltd., Intel Corporation, Matsushita Electric Industrial Co., Ltd., Sony Corporation and Toshiba Corporation
Mr. Seth D. Greenstein
McDermott, Will & Emery
600 Thirteenth Street, N.W.
Washington, D.C. 20005

Bellsouth Corporation and Bellsouth Interactive Media Services, Inc.
Mr.William B. Barfield
Suite 1800
1155 Peachtree Street, N.E.
Atlanta, Georgia 30309

Mr. Thompson T. Rawls, II
Suite 1800
1155 Peachtree Street, N.E.
Atlanta, Georgia 30309

Consumer Electronics Manufacturers Association
Mr. Gary Klein, Esq.
Vice President
2500 Wilson Boulevard
Arlington, Virginia 22201

Mr. David R. Siddall, Esq.
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, NW, Suite 700
Washington, D.C. 20005

Benedek Broadcasting Corp., Chronicle Broadcasting Co., Draper Communications, LIN Television Corporation, Midwest Television, Paxton Media Group, Raycom Media, and Spartan Communications

Mr. Stephen A. Weiswasser
Covington & Burling
1201 Pennsylvania Avenue, N.W.
P. O. Box 7566
Washington, D.C. 20044

Ms. Mary Newcomer Williams
Covington & Burling
1201 Pennsylvania Avenue, N.W.
P. O. Box 7566
Washington, D.C. 20044

Benedek Broadcasting Corporation
Mr. K. James Yager
President & Chief Operating Officer
100 Park Avenue
Rockford, Illinois 61101

Draper Communications, Inc.
Mr. Thomas H. Draper
President
729 N. Salisbury Boulevard
Box 2057
Salisbury, Maryland 21801

Chronicle Broadcasting Company
Ms. Amy McCombs
President & Chief Executive Officer
1001 Van Ness Avenue
San Francisco, California 94109

Lin Television Corporation
Mr. Gregory M. Schmidt
V.P., New Development & General Counsel
1001 G Street, N.W.
Washington, D.C. 20001

Benedek Broadcasting Corp., Chronicle Broadcasting Co., Draper Communications, LIN Television Corporation, Midwest Television, Paxton Media Group, Raycom Media, and Spartan Communications

Midwest Television Inc.
Mr. August C. Meyer
President
509 S. Neil Street
P. O. Box 20
Champaign, Illinois 61824

Mr. Jack B. Everette
President & Chief Operating Officer, Broadcasting Operations
509 S. Neil Street
P. O. Box 20
Champaign, Illinois 61824

Raycom Media, Inc.
Mr. John E. Hayes
President/Chief Executive Officer
RSA Tower, 20th Floor
201 Monroe Street
Montgomery, Alabama 36104

Ms. Rebecca S. Bryan
V.P./General Counsel
RSA Tower, 20th Floor
201 Monroe Street
Montgomery, Alabama 36104

Paxton Media Group, Inc.
Mr. Richard Paxton
President, WPSD-TV
100 Television Lane
P. O. Box 1197
Paducah, Kentucky 42002

Mr. J. Fred Paxton
President
100 Television Lane
P. O. Box 1197
Paducah, Kentucky 42002

Benedek Broadcasting Corp., Chronicle Broadcasting Co., Draper Communications, LIN Television Corporation, Midwest Television, Paxton Media Group, Raycom Media, and Spartan Communications

Spartan Communications, Inc.
Mr. Nick W. Evans
President/Chief Executive Officer
250 International Drive
P. O. Box 1717
Spartanburg, South Carolina 23904

Mr. John W. West
Executive Vice President
250 International Drive
P. O. Box 1717
Spartanburg, South Carolina 23904

Philips Electronics North America Corporation

Mr. Thomas A. Patton
V.P., Government Relations
Philips Electronics North America Corporation
1300 Eye Street, N.W. Suite 1070 East
Washington, D.C. 20005

Mr. Lawrence R. Sidman
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
891 15th Street, N.W. Suite 700
Washington, D.C. 20005

Ms. Sara W. Morris
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
891 15th Street, N.W. Suite 700
Washington, D.C. 20005

Thomson Consumer Electronics, Inc.

Mr. David H. Arland
Manager, Government & Public Relations, Americas
Thomson Consumer Electronics, Inc.
P.O. Box 1976, INH-110
Indianapolis, Indiana 46206-1976

Thomson Consumer Electronics, Inc.

Mr. Lawrence R. Sidman
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, N.W., Suite 700
Washington, D.C. 20005

Mr. John M. R. Kneuer
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, N.W., Suite 700
Washington, D.C. 20005

Ms. Sara W. Morris
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, N.W., Suite 700
Washington, D.C. 20005

Circuit City Stores, Inc.

Mr. Alan McCollough
President & COO
9950 Mayland Drive
Richmond, Virginia 23233

Mr. W. Stephen Cannon
Sr. V.P. & General Counsel
9950 Mayland Drive
Richmond, Virginia 23233

Mr. Robert S. Schwartz
McDermott, Will & Emery
600 13th Street, N.W.
Washington, D.C. 20005

Ms. Catherine M. Krupka
McDermott, Will & Emery
600 13th Street, N.W.
Washington, D.C. 20005

Ms. Julie Y. Patterson
McDermott, Will & Emery
600 13th Street, N.W.
Washington, D.C. 20005

Harris Corporation

Mr. Michael Riksen
Director, Government Relations
Harris Corporation
1201 East Abingdon Drive
Suite 300
Alexandria, Virginia 22314

Mr. Lawrence R. Sidman, Esq.
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, NW, Suite 700
Washington, D.C. 20005

Mr. David R. Siddall, Esq.
Verner, Liipfert, Bernhard, McPherson & Hand, Chartered
901 15th Street, NW, Suite 700
Washington, D.C. 20005

The Association for Maximum Service Television, Inc.

Mr. Victor Tawil
Senior V.P.
The Association for Maximum Service Television, Inc.
1776 Massachusetts Avenuw, NW
Washington, D.C. 20036

Mr. Jonathan D. Blake
Covington & Burling
1201 Pennsylvania Avenue, NW
Washington, D.C. 20007

Ms. Ellen P. Goodman
Covington & Burling
1201 Pennsylvania Avenue, NW
Washington, D.C. 20007

Ms. Mary Newcomer Williams
Covington & Burling
1201 Pennsylvania Avenue, NW
Washington, D.C. 20007

Microsoft Corporation

Mr. Marc Berejka
Federal Regulator Affairs Manager
Microsoft Corporation
21 Dupont Circle, Suite 510
Washington, D.C. 20036

Microsoft Corporation

Mr. Kevin DiLallo
Levine, Blaszak, Block & Boothby, LLp
2001 L Street, NW
Suite 900
Washington, D.C. 20036

Mr. Justin Castillo
Levine, Blaszak, Block & Boothby, LLp
2001 L Street, NW
Suite 900
Washington, D.C. 20036

National Association of Broadcasters

Mr. Lynn D. Claudy
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Mr. Arthur W. Allison III
NAB Science & Technology
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Mr. Mark R. Fratrik, Ph.D.
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Mr. Gregory Guy
NAB Research & Planning
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Ms. Holly Saurer
NAB Legal Intern
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

National Association of Broadcasters
Mr. Henry L. Baumann
Counsel
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Mr. Jack N. Goodman
Counsel
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

Ms. Valerie Schulte
Counsel
National Association of Broadcasters
1771 N Street, N.W.
Washington, D.C. 20036

General Instrument Corporation
Mr. Quincy Rodgers
Vice President, Government Affairs
1133 21st Street, NW, Suite 405
Washington, D.C. 20036

Mr. Jeffrey Krauss
Consultant
622 Hungerford Drive, Suite 21
Rockville, Maryland 20850

Motion Picture Association of America, Inc.
Mr. Ted Cohen
V.P. & Counsel New Technology
1600 Eye Street, Northwest
Washington, D.C. 20006